MINERVAHAVEN WATER RESILIENT

A LIVEABLE AND AFFORDABLE PLACE FOR STARTERS

RESEARCH & REFLECTION REPORT
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TOBY VAN WIJNGAARDEN - 4449940
TUTORS: THEO KUPERS, FERRY ADEMA & PIERIJN VAN DER PUTT
AR4AD110 DWELLING GRADUATION STUDIO - DUTCH HOUSING

PREFACE

This research and reflection report is part of the Dwelling Dutch Housing Design Studio I'm attending at the architecture faculty of TU Delft. I'm currently in the MSc 4 which means that I'm in the last phase of graduating. Besides the P4 presentation about my design proposal I also have this research and reflection report where I look back at the entire process from the previous months.

Making this report was interesting, because I never really had to reflect as detailed on the process from previous design studios I attended as I was able to do now. By attending this graduation studio, which was four times as long as other non-graduation design studios, a long journey has taken place with many ups and downs. This was an ideal opportunity to reflect on the different aspects I ran into through the months.

This report is not about elaborating my design proposal, but it shows how different kinds of research have influenced my design process. Furthermore, this report will focus on reflecting what I have learnt from the entire process and how that is visible in my learning curve. Reflecting on the research and design process is a way to learn things from it and take it with me into the future, not only for my career but also for my personal life experiences.

Toby van Wijngaarden
Zoetermeer, The Netherlands

CONTENT

INTRODUCTION

Two aspects are key in this phase of graduating: the design proposal and reflecting on the entire process. The design proposal will be done by presentation while this document is about reflecting on the research and design process.

Many ups and downs were present in the process where I started from scratch and ended up with a proposal that helps solving problems we face now and in the future. In this report I'm going to reflect on the research I have done and how it has influenced my design process, design proposal and personal learning curve.

To have a chronological storyline, I will start by writing in the first chapter about the research and design questions I have established for my P2 and graduation plan.

In the second chapter I will describe the available research methods and which of them have been used to both answer my research and design questions from previous chapter and to solve (architectural) challenges in the design process. Also, a connection will be made with the AR3A160 Research Methodology course.

The third chapter focuses on the reflection of my research and design process in which I will look at the diversity of the used research methods and how the research results are translated into the design proposal. Furthermore, a critical reflection will take place to understand what could have improved during the process. Finally, my graduation plan will be compared with the actual research and design process. This reflection helps me understanding the relation between research and design.

Finally, an overall reflection will take place in which I describe my learning curve and how the feedback from my tutors have influenced both my personal development and my design proposal. Furthermore, I will reflect on the scientific relevance and transferability of my research, the ethical issues I have encountered and the relationship between my topic, studio topic and master track.

1. RESEARCH & DESIGN QUESTIONS

This chapter focuses on elaborating the research and design questions I have established for my P2 and graduation plan.

RESEARCH QUESTIONS

Before being able to answer the design question with my design proposal I have done research based on main and sub research questions. The sub questions helped me to get control in answering the main research questions.

I have divided the research questions in relation to my topic and my target group. In that way I made sure that both aspects will get the right attention. The two research questions are as follows.

Research question in relation to my topic:
Where should water resilient measures be taken place to help solving rainwater problems we face now and in the future?

"Water resilient" is key in this research question because it means that something is being able to withstand or recover quickly from difficult conditions. This represents the more extreme weather conditions we face now and in the future.

Sub questions:
- *How much rain falls every year and when are the extreme periods?*
- *How can rainwater be retained long enough to meet the norms established by the municipality of Amsterdam?*
- *What are the consequences for the open (public) spaces?*
- *In what way should the dwelling unit and environment work together to make Minervahaven water resilient?*

Research question in relation to my target group:
How can compact dwellings be organised while maintaining the quality of living?

The two words "compact" and "quality" can have different interpretations. For this research question, "compact" means that something, in this case the dwelling, takes up a small area and is having only the necessary components fitted. "Quality" is in this case the excellence of something measured against other elements that are almost similar from character.

Sub questions:
- *What are the main preferences of the starter?*
- *Which functions are the starters willing to share with each other?*
- *What are the minimal obligated dimensions of the functions in a dwelling unit?*
- *What defines a qualitative way of living in a compact dwelling unit?*

DESIGN QUESTION

Besides the research part there is also the architectural design part in this process. For defining the design question, I have been looking for a question that can be answered in a way that it tackles the problems I have discovered during the research process both for my topic and target group.

Design question:
In what way can architecture contribute in designing a water resilient Minervahaven which is a liveable and affordable place for starters?

Two words in this question are key to have an answer that says something about both my topic and my target group: liveable and affordable.

Liveable is used to explain that even though we will face water problems, the site will stay an environment where people can live now and in the future. Affordable is used to explain that the starters as target group will be able to buy a dwelling in Minervahaven to help solving the problems they face in the current housing market and economy.

2. RESEARCH & DESIGN PROCESS

I will describe in this chapter the available research methods and which of them have been used to both answer my research and design questions from previous chapter and to solve (architectural) challenges in the design process. Also, a connection will be made with the AR3A160 Research Methodology course.

AVAILABLE CATEGORIES OF RESEARCH METHODS

For me, a design process always starts with gathering information about the design assignment. Where is the design site? What is the program? What should be taken into account? All these kinds of questions are the start of a long process to make a design proposal. Doing research is key in being able to clarify the decisions that have been made. You have something to fall back on which makes your decisions more reliable.

Lucas[1] mentions three elements that are defining a research: context led, methodology led and theory led. Context led is about how conditions found somewhere else can be used for the design site. Methodology led focuses on established methodologies[2] and how that can be applied into a design proposal. Theory led helps establishing a form of understanding to determine the deeper meaning of something (2015).

A huge variety of research methods[3] can be used, while all of them have a certain connection with the three elements described by Lucas. To prevent going too deep into detail, I will focus only on some of the research methods I have learnt during the "AR3A160 - Lecture Series Research Course". During the weeks, I have learnt what position research has in the design process and how different research methods can be used. The lectures were interesting, because the different methods became clear and how they can have a contribution in the further design process.

A common research method is literature research which is a research method that is theory led and focus on something that is written in the past by another researcher.

The second research method I want to address is praxeology, which is mentioned by Berkers during the lecture series. It focuses on the social and spatial practices by studying the daily human actions in the built environment. According to Lucas, praxeology gives us access to how people live (2015).

This is an ideal research method to make sure that the actual users of a building are matching with the ones that have been the target group during the design process. To make sure that the target group is matching with the building users it is important to understand the target group's behaviour and preferences.

Research methods such as interviewing and observing can be ways to get to know the target group's behaviour. Interviewing can be done for example personally or by surveys. Observations are less direct and can be done by capturing the target group's behaviour by for example taking pictures or (analytical) drawings.

Phenomenology is a research method that has been elaborated by Havik during the lecture series. It is a context led subjective way of doing research because it is about researching the way in which things appear to us. We will use our senses to experience the role of our body in a certain space. It is a subjective way of doing research because people are using their senses differently and have different opinions about what they like or don't like. Going on a site visit is a way to use your senses to experience an environment. As an architect this is an ideal way to start the design process because you can experience the design site. The only way to make phenomenological research more objective and more reliable, is by combining many subjective experiences from individuals and bring them together into one conclusion.

Another research method is focusing on material culture. As a researcher you will look at objects and the materialisation of it to try to get an understanding of

1. Lucas, R. (2015). *Research Methods for Architecture*. United Kingdom, London: Laurence King Publishing.
2. Different ways of analysing methods that can be applied to do research.
3. Techniques or ways that help making steps to achieve a certain goal.

culture and social relations. Materials will be compared and ordered. Playing with different combinations of materials is an ideal approach to try to understand how the material behaves. Being precise is important in the research and when you do research on a smaller scale level such as physical models, it is sometimes necessary to make abstractions in the research process. A connection can be made with phenomenological research because the researcher will use his or her senses to investigate and experience the different compositions of materials.

I find it helpful to divide the research methods into two categories: research through design and design by research. Where literature research, praxeology and phenomenology are examples of design by research, material culture is more focused on research through design, because the research is focused on designing different material compositions.

Another way to categorise research is by deciding whether it is a quantitative or a qualitative research. Quantitative research is focusing on statistics and values while qualitative research is focusing on written texts.

With this paragraph I wanted to make clear for both myself and the reader what the general outlines are of doing research and how a variety of research methods can be used for different purposes during a (design) process.

USED RESEARCH METHODS

Previous paragraph helps me to categorise the research methods I have used during the entire process. It will be interesting to see if there is a certain relation between the types of research I have used and the phase I was in when doing that research. Therefore, I would like to show different kinds of research I have done with a short elaboration.

The first step in the process was visiting the design site. While being there I looked around and tried to understand the qualities of the site and what is lacking. I always like to write down my first impressions (figure 1) to prevent that I will forget it in the future. Even though I always work like this, I never realised that this is the first research I do in the process. Looking back at the previous paragraph it becomes clear that the site visit is as a phenomenological research method, because of using my human senses.

Besides the site visit I started reading literature to define my topic and target group for the design assignment. This process of reading different articles, reports and books was part of my P2 research report in the form of a summary (figure 2). So, this is a good example of a theory led research where I was looking for references and argumentation that I could use to enhance the relevance of the chosen topic and target group.

At the same time, I started doing own research in relation to my topic and target group. Two examples are the rainwater calculations I have done and an economic research to understand whether it is feasible or not to have starters as my target group (figure 3). These kind of quantitative research makes the design assignment more precise and plausible because I had something to rely on with the design decisions I have made.

A qualitative research method I have used is for researching the preferences of my target group (figure 4). I wanted to know more precise how my target group lives and what they prefer. The results I eventually found came from surveys that have be done by other researchers. Survey is an ideal method to get to know the preferences of a person which makes it a praxeological research method, because, as described in the previous paragraph, it is a form of studying the actions of a human in the built environment.

There was also a period around the P2 that I used other people's research to start my own research. The first research I want to mention is analysing case studies. By observing the architectural and technical drawings I started to understand the layers of information in the drawings, which I could use as starting point for my own design proposal (figure 5).

A second research I want to mention is the research where I combined literature with my own research. I wanted to define what the meaning is of a "qualitative" dwelling which helped me answering one of the sub questions of the research question in relation to my target group. To be able to do that I read books such as "Small & chic interiors" by Gutierrez and "Compact living" from Beazley which focussed on realising compact dwellings. After having read the books I made a checklist with the main points that can enhance the quality of a compact dwelling. This research is a qualitative research (due

Geen titel

Clean
Windy
Coast used for new office buidling
Some bus stations, car is still dominant but not annoying
Height in new buildings almost the same, expression totally different
Shift in function already in progress
Not much infrastructure (good way to keep it as it is?)
Industrial view (nearby)

Topics:
Ultra flexible (change in function after 2040?)

Target groups:

Laatst gewijzigd: 9 sep. 2019
Gemaakt: 9 sep. 2019

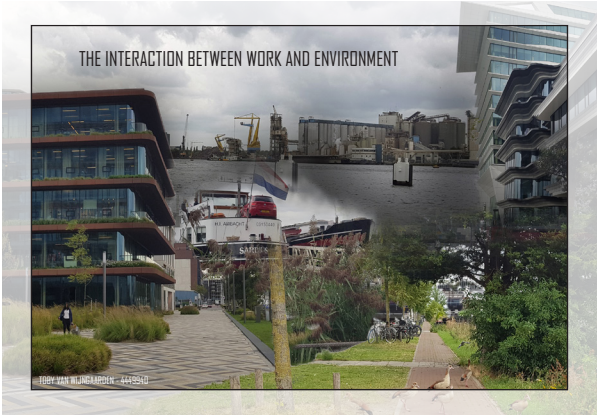

Figure 1. *My experiences from the site visit.* (Author).

DIFFICULTIES FOR THE STARTERS

The titles of the news articles on page 15 suggest the relevance of my target group. Starters are having difficulties buying or renting their first house and especially in Amsterdam.

The difficulties to find a house in Amsterdam is enhanced by two things, visible in figures 5 and 6. The economic value of houses have been increased in the previous years. ANP/DFT mentions a 3,5% increase nationwide and in the big cities such as Amsterdam, Rotterdam, The Hague, Utrecht and Eindhoven an increase of 7,7% in 2019 (2019). This can be declared because we are getting out of the economic crisis and the increase of popularity in living in big cities such as Amsterdam. It is also the stagnation of the housing market that increases the economic value and the difficulties for the starter. Older people rather stay in their (too) big house than moving to a smaller house that fits their lifestyle better. This causes that every younger person or family can't move. So, even though there are maybe some starters that can afford a house in Amsterdam, they can't buy it because the housing market is stagnated.

Another aspect, visible in figure 5, is the statistic that through the years less houses are available on the housing market in Amsterdam. This is also visible in figure 6. The lack of available building stock can be a reason why the economic value has increased a lot, because when the demand is higher than what can be provided, it will result in an increase in economic value.

The municipality of Amsterdam has published a document which contains research about starters. It states that the stagnation of the housing market results in long waiting times. People between 18 and 25 years have the lowest chance of getting a house (2017b). Because of this, the problems will be enhanced, because according to municipality of Amsterdam there is an increase visible in the amount of people between 12 and 18 years (2017a). So, there will be even more starters in the future.

According to DFT the Dutch government introduced a new system which makes it possible for people to rent more. But even with measures like that, it won't help because the housing prices are increasing as well. It becomes more and more normal that the parents need to help their children to have enough money to finance a mortgage (2018).

ILLEGAL HOUSING MARKET

The stagnation, the expensive houses or the high rental prices and the long waiting lists results that the current housing market can't fulfil the demands of the starters. According to Hochstenbach, it is not only the long waiting lists but also the annoying aspect of visiting the houses when you are interested. With not much building stock available, many people would like to visit a house, which leads to an unpleasant and busy experience (2014).

However, the starters want to find a house, no matter what they have to do for it. So, they are in a position that they start looking in ways that can be smart but also, according to Hochstenbach, sort of illegal. By using untrustworthy housing markets, starters can find a house they like and can afford while at the same time not having to wait long. Hochenstach mentions examples such as moving from period to period to temporarily rooms/houses and participating in untrustworthy housing markets due to pawnbrokers. What is interesting is that starters rather have their "illegal" house in an attractive neighbourhood than a normal house far from the location they want to life and have to wait for a long period of time (2014).

CONCLUSION

The challenge is to create a bigger housing market for the starters between 18 and 25 years old in order to fulfil their demands and don't kick them out of Amsterdam. This makes sure that starters won't start looking on untrustworthy housing markets for an "illegal" house. The question is what starters can afford and if it is feasible to have starters as target group for my design proposal in Minervahaven since it is located close to the expensive Amsterdam's city centre.

Figure 2. *Summary of the literature research in relation to my target group.* (Author).

Mortgage	ABN Amro	Moneywise	Rabobank	ING	Average
1x MBO	€ 49.824	€ 51.218	€ 47.049	€ 49.075	**€ 49.292**
2x MBO	€ 155.149	€ 161.366	€ 151.870	€ 158.411	**€ 156.699**
1x HBO	€ 99.789	€ 103.517	€ 94.536	€ 98.607	**€ 99.112**
2x HBO	€ 199.577	€ 207.507	€ 195.296	€ 203.707	**€ 201.522**
1x WO	€ 118.359	€ 121.671	€ 108.322	€ 116.868	**€ 116.305**
2x WO	€ 251.014	€ 258.037	€ 238.966	€ 249.257	**€ 249.319**
MBO + HBO	€ 177.363	€ 184.437	€ 176.584	€ 181.059	**€ 179.861**
MBO + WO	€ 201.820	€ 207.467	€ 191.698	€ 199.954	**€ 200.235**
HBO + WO	€ 224.712	€ 230.999	€ 213.411	€ 223.540	**€ 223.166**

	Annual income	Affordable area
1x MBO	€ 49.292	**9,6 m2**
2x MBO	€ 156.699	**30,5 m2**
1x HBO	€ 99.112	**19,3 m2**
2x HBO	€ 201.522	**39,3 m2**
1x WO	€ 116.305	**22,7 m2**
2x WO	€ 249.319	**48,6 m2**
MBO + HBO	€ 179.861	**35,0 m2**
MBO + WO	€ 200.235	**39,0 m2**
HBO + WO	€ 223.166	**43,5 m2**

Figure 3. *Part of my economic research in relation to my target group.* (Author).

Type of Starter	Climbing Starter	Young Starter
Age	20 - 30 years	18 - 25 years
Education	HBO - WO (Mid to High)	MBO - HBO (Low to Mid)
Income	Mid-income with potential to become high	Low-income
Is looking for...	A house to live on their own or to live with someone together	A house to live on their own
Wants	Freedom, fun, comfort.	Privacy, tranquillity and space
Budget	€125.000 - €150.000 (= +/- 25-30m2)	€125.000 - €150.000 (= +/- 25-30m2)
Environment should be...	A quiet place close from where everything happens	A quiet place close from where everything happens
Living room located at....	Street side	Street side
Living room vs. balcony	Rather big living room than big balcony	Rather big living room than big balcony
Transport	With the bicycle in the neighbourhood and with the car for longer distances	With the bicycle in the neighbourhood and with the car for longer distances
Amenities	Daily stores nearby. Sports, catering industry and cultural events important	Daily stores nearby. Sports is important as well
Other	Price is sometimes more important than atmosphere 44% wants working space Special (shared) laundry room	Prefers a big living room and bedroom Prefers a balcony or garden. Size doesn't matter

Figure 4. *One of the overviews of my target group's preferences.* (Author).

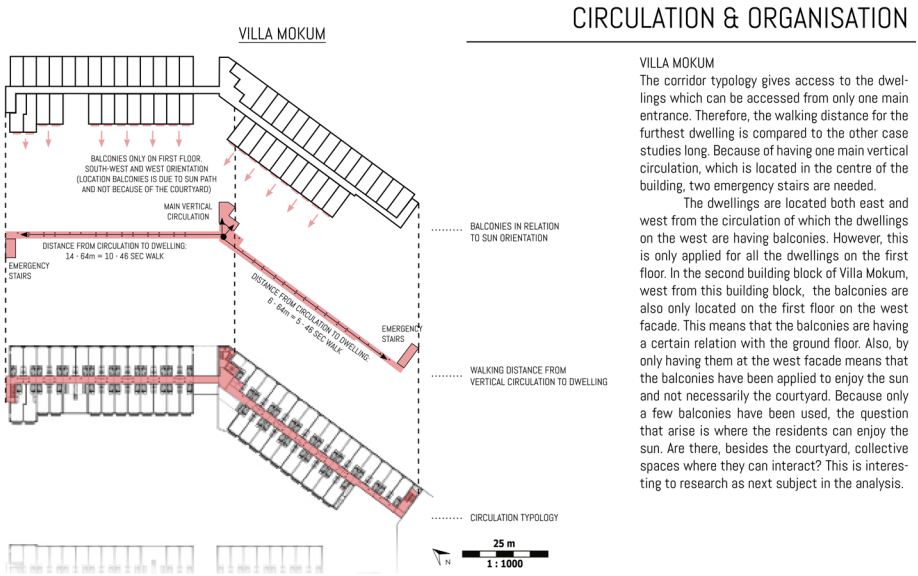

Figure 5. *One of the ways I analysed casestudies.* (Author).

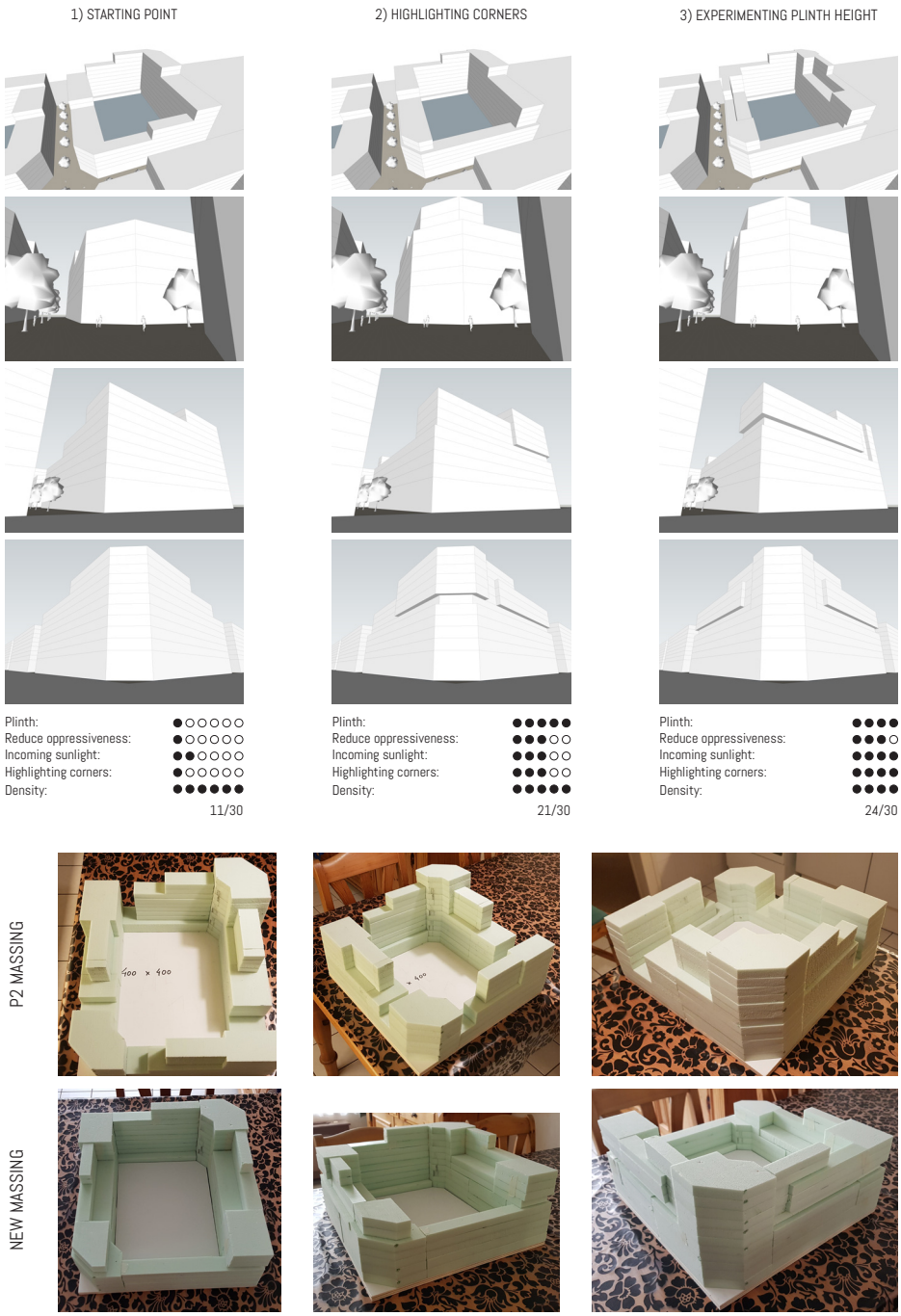

Figure 6. *Define massing through different research methods.* (Author).

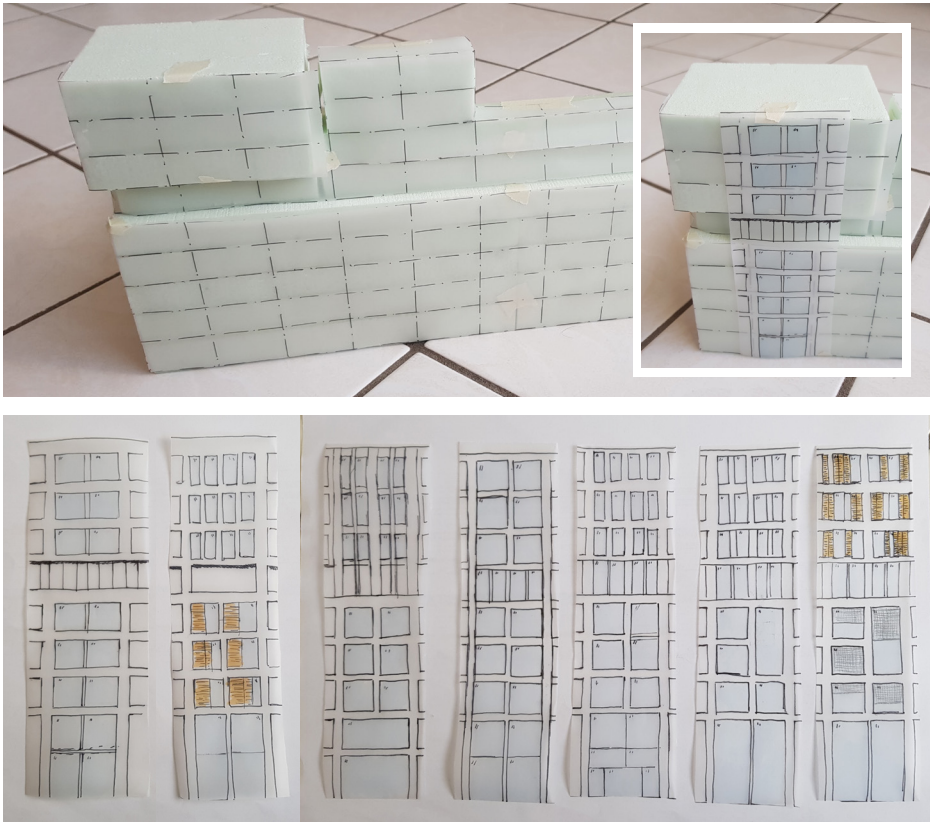

Figure 7. *Researching facade by comparing different options.* (Author).

Figure 8. *A minor research about materialisation.* (Author).

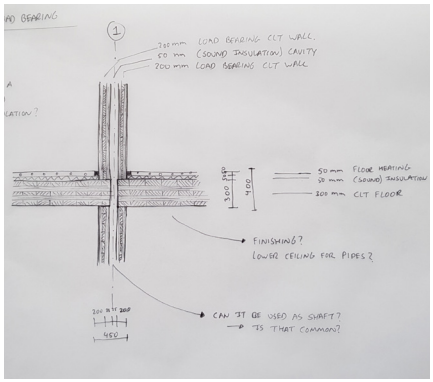

Figure 9. *Trial and error process while sketching.* (Author).

to the literature) and a quantitative research (due to grading the case studies based on the checklist) at the same time.

The transition to my own research continues after the P2 because I came to the phase where architectural research got the attention and is characterised as research through design. Physical models have been made in combination with computer models to define the massing (figure 6). Also, the physical model is used to adjust the massing and to make the first attempts of the architectural impression of the facade (figure 7).

The kinds of research I have done after the P2 are key in the architectural impression of the design and focused sometimes on small details. An example is researching the combination of different bricks in the facade that will create an impression I'm looking for (figure 8). Just like in the research of the physical model (figure 6), I tested different options and scored them based on certain categories. This helped me to clarify the decisions I have made during the design process.

Another research is sketching different building technology details to start the building technology side of the design (figure 9). When I sketch, it is often a trial and error process in which I try new things by learning from references and the feedback from my building technology professor.

BENEFITS OF USING VARIOUS RESEARCH METHODS

Based on the previous paragraph it can be concluded that a variety of research methods have been used through the process. From literature research at the beginning to testing different architectural brick impressions at the end.

I always find it useful to start with general research to start defining the direction I want to go to and set some parameters that I can use in the next phase. By deriving that from reading literature and analysing case studies I have gained knowledge that I was able to take with me. This process of using other's research results and analysing can be short or long, but in every case a transition needs to be made. That transition became visible around the P2, as described in the previous paragraph, and has been important to make the shift from answering the research questions to answering the design question.

Every research has its own contribution in the process. I see it as a diagram in the form of a pyramid where the bottom is the starting point of the process. Because it is the base it needs to be big and strong. In other words, the research results should be trustworthy and functioning as the starting point for the further design process. If the base is not strong enough, everything will "collapse". That is why I started at the beginning with the more general research by reading literature and through the weeks the transition found place to own and more precise research, which represents the top of the pyramid. This is visible in figure 10.

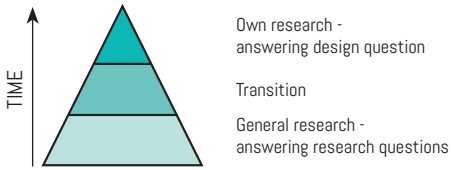

Figure 10. *Translation of research process through time.* (Author).

ANSWERING MY RESEARCH AND DESIGN QUESTIONS

Previously, I have made visible which research methods I have used and how a transition became visible through the process. In this paragraph I will focus on answering the research and design questions from chapter 1.

The research question in relation to my topic is: "*Where should water resilient measures be taken place to help solving rainwater problems we face now and in the future?*".

The first decision I had to make is whether to take the area around the building site into account to make the design water resilient. Eventually, I have chosen to focus on making the building site water resilient and not taking the environment into account. This because the norms and measurements that can be applied by the municipality of Amsterdam and the document Amsterdam Rainproof are mostly focussing on the building scale level.

I started doing research to understand the different possibilities of retaining water long enough during extreme rain periods. At the same time, I saw the opportunity to bring it a step further to make it sustainable as well. The step I have made is to not only

retain the water for 24 hours (as described in the municipality' norm) but that it can be used for the vegetation and flushing the toilets in the building. In this way the rainwater will get a multifunctional purpose.

To make this concept feasible, I did calculation about how much rainwater will fall through the year and during extreme rainfall periods, how much of it will be absorbed by the vegetation and how much can be used for flushing toilets. In that way I was able to calculate how much surface area is needed to store rainwater. This was important to start making it in building technology point of view feasible as well.

Eventually, the building should be able to retain a 60L/m^2 rainfall (373.800L of rainwater) for 24 hours. This is equal to the norms established by the municipality of Amsterdam. Because this is way more than the average rainfall through the year, the storage areas will be big enough for the annual amount of rainfall. 56,7% of the rainfall will be absorbed by vegetation that are present in the collective outdoor spaces. The remaining 43,3% will be stored at the technical rooms in the building for flushing the toilets. 41,1% of the annual toilet usage in the building can be covered from using rainwater, which is equal to the toilet usage of 173 persons per year. To put it in a different perspective, the amount of rainwater that can be used for flushing the toilets is equal to the annual water usage of 46 persons (10,9% of the total persons in the building).

The research question in relation to my target group is: "*How can compact dwellings be organised while maintaining the quality of living?*".

It turned out that the starters are only able to afford a dwelling in Amsterdam when the dwellings are compact. By making a compact dwelling, the standard organisation of a dwelling can't be applied. Some of the private functions had to be removed which led to a different design strategy. The building will be characterised by a balance between private spaces in the form of the dwellings and collective spaces where the households can use the same facilities.

The benefit of changing a private function into a collective function is that more space will be available in the dwelling, which enhances the quality of the compact dwelling. At the same time, it makes it easier to meet the minimum obligated dimensions of the functions in a dwelling unit. As mentioned in the previous chapter, a checklist has been made based on the literature I have read. The checklist (figure 11) contains elements which can contribute in creating quality in a compact dwelling. I have used it to analyse the case studies and to make sure that my designed dwellings will have a certain level of quality.

To conclude, is important to have a balance between private and collective functions in the building, which will become convincing when it meets the preferences of the starters. The quality in the dwelling can be enhanced by especially taking the checklist (figure 11) into account. With the checklist I make sure that all the dwelling types and typologies are designed with the focus to enhance the quality of their compact floor area.

MAKE IT LOOK BIGGER THAN IT IS TO REDUCE OPPRESSIVENESS	
1.1	REDECORATION, REORGANISATION & LIGHTING (ILLUSION)
1.2	USE MIRRORS
1.3	DAYLIGHT
1.4	COLOURS (BOTH OVERDAY & EVENING)
1.5	(NATURAL) VENTILATION
1.6	HIDE SMALL BUT DISTRACTIVE (TECHNICAL) DETAILS & GADGETS
1.7	ORGANISATION OF FLOOR PLAN (LINEAR, CIRCULAR, ETC.)
1.8	LIMITING USING WALLS (OR USE IT AS STORAGE SPACE)
1.9	CEILING HEIGHT
1.10	KEEP IT CLEAN, OPEN & CALM

MULTIFUNCTIONALITY TO BE EFFICIENT WITH AVAILABLE SPACE	
2.1	DIFFERENT CONFIGURATIONS (DAY, NIGHT, STUDIO, PARTY, ETC.)
2.2	USELESS SPACE AS STORAGE SPACE (F.E. UNDERNEATH STAIRS)
2.3	COUCH TRANSFORMING TO BED OR USING FOLDING BED
2.4	SLIDING DOORS

USAGE OF THIRD DIMENSION (VERTICALITY)	
3.1	STACKING FUNCTIONS
3.2	STORAGE ABOVE OR UNDERNEATH OTHER FUNCTIONS
3.3	CEILING HEIGHT TO MAKE IT LOOK BIGGER

Figure 11. *Checklist to enhance quality in a dwelling unit.* (Author).

The two research questions helped me going into the design process with enough knowledge to make the right architectural decisions. These decisions are key in creating a design proposal that contributes in solving the rainwater problems we will face now and in the future and at the same time it will offer the starters a dwelling in Amsterdam which they can afford.

Eventually, at the end of the design process I have been able to answer the design question: "*In what way can architecture contribute in designing a water resilient Minervahaven which is a liveable and affordable place for starters?*".

For me, it was important to make the measurements I have taken visible in order to understand what the building is about. Therefore, I have been looking for a certain interaction on different scale levels between the human senses and the architectural elements I have designed.

For example, when standing outside, they can already see how the composition and way of materialisation of the facade suggests that floor heights have been increased (3,5m). This makes it possible to have enough daylight and to use the height as storage space in the compact dwellings. Also, I have been looking for multifunctionality in the dwelling floor plans by having beds that can be lifted during the day which results that more floor space is available.

Furthermore, space is reserved at the corners of every floor level and in the middle of the corridors for collective functions. These spaces can be used for a variety of functions such as a kitchen, working space, fitness room and laundry room. In this way a set of collective functions is realised that meets the preferences of the starters. At the same time, the functions of these spaces can change to being able to react on the change in demands of the residents in the future. Collective outdoor spaces on different floor levels give the residents the opportunity to enjoy being outside while being on the same floor level as their dwelling. These outdoor spaces are also important in absorbing the rainwater to help solving the problems in relation to my topic.

A final measurement I want to mention is that I have applied a shared electrical car system. Research has been done and calculations have been made to get to know how many starters would like to use a car and how many households can use one shared car. This results that the amount of cars is reduced with 89,3% compared to the current situation. The car/dwelling ratio of 0,1 is 50% lower than the norm of 0,2 defined by the municipality of Amsterdam.

It can be concluded that architecture has been used to stimulate the interaction between the households and the architectural elements. These elements are the translation of tackling the problems in relation to my topic and target group. What is important not to neglect is the contribution of the building technology side of the architectural elements that have been designed. Every architectural decision I have made has been made feasible by the building technology side of the design. For example, the construction of the courtyard had to be adjusted and strengthened to carry all the soil and vegetation.

3. REFLECTING ON RESEARCH & DESIGN PROCESS

This chapter focuses on the reflection of my research and design process in which I will look at the diversity of the used research methods and how the research results are translated into the design proposal. Furthermore, a critical reflection will take place to understand what could have improved during the process. Finally, my graduation plan will be compared with the actual research and design process. This reflection helps me understanding the relation between research and design.

DIVERSITY OF USED RESEARCH METHODS

Based on previous chapter it becomes clear that different kinds of research methods have been used during the research and design process. In this paragraph I will give a summary of the most common research methods I have used in a chronological way during the process:

- It all started with the site visit where I used my senses to experience the place. Even though it doesn't seem as a research method, it can be very useful to experience the qualities of the environment.
- Literature research is done many times, especially during the research phase, where documents such as reports, books and surveys has been read and studied. I also combined it with doing own research where I used literature as a starting point of my own research such as the economic research (figure 3) from previous chapter.
- Analysing case studies has been another research method where I have been studying other projects to try and understand the essence of it.
- Research through design has been dominant in the design phase. A trial and error process in the form of sketches, physical and 3D-models, references and using the feedback from the professors to improve the (architectural) design.

This summary shows a diversity of research methods which especially becomes clear based on the number of subjects that have been addressed.

In my graduation plan I described at "Method description" how I think different kinds of research can contribute in answering my research and design questions. I wrote this:

"*Working towards the P2 I have focused on getting grip on both topic and target group. Therefore, literature was key in order to define the relevance of both aspects. With this objective way of doing research I have been able to answer some of the sub questions that are part of the research questions. Besides using literature to answer sub questions, I already have worked on analyses.*". Later it continues with: "Analysing *helps me realising what the possibilities are and how certain problems have been solved in those projects. It functions as a starting point for my own design proposal. Together with the literature I have been using for the research I have done so far, this research can be called design by research. To define my concept, I would like to move from a design by research method to a research through design method where designing is a tool to do research. This will be the stage where I will use the different techniques I have learnt during both my Bachelor and Master. Examples are, using (small and quick) physical models and sketching.*".

It becomes clear that I was already aware which research methods I wanted to use or had been using already. What is missing compared to the chronological story about the used research methods described in the previous chapter is the transition phase. In my graduation plan I was not aware about any kind of transition phase. By reflecting on this process and comparing it with my graduation plan it becomes clear that the transition phase is important. It makes the process more precise and smoother which enhances the diversity and quality of the work.

CONTRIBUTION OF DOING RESEARCH

So far, this report focused on describing the available and used research methods and how the transition between different research methods became visible. In this paragraph I will describe how the used research methods have had their contribution in the final design proposal by helping me solving architectural problems and at the same time focusing on my topic and target group.

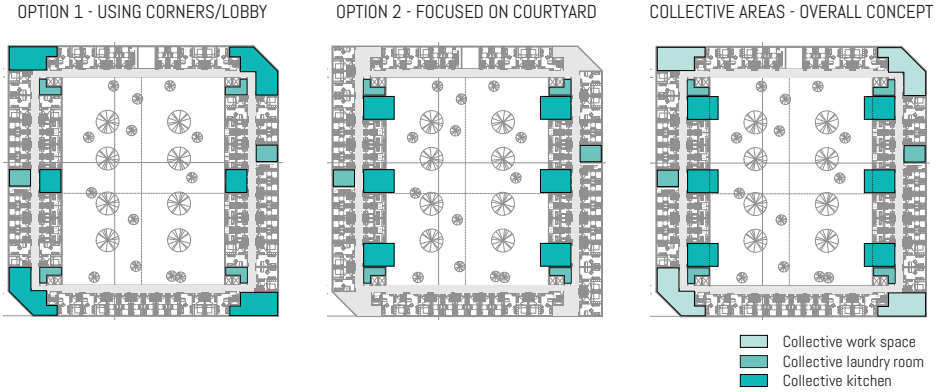

Figure 12. *Research to the organisation of collective functions.* (Author).

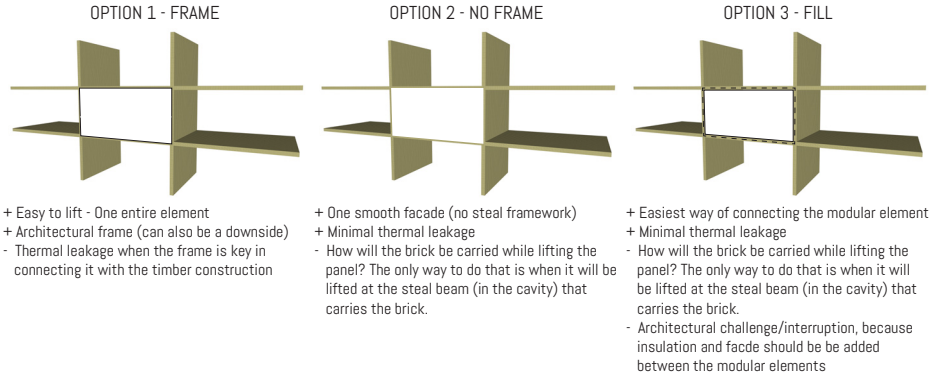

Figure 13. *Research to modular facades.* (Author).

Figure 14. *Research to making the environment flood proof.* (JTP Architects, 2016*).

* Source: https://www.jtp.co.uk/news-and-events/news/jtp-wins-sunday-times-british-homes-award-for-resilient-home-of-the-future. Visited on 02-05-2020.

I see it as putting all the research I have done into three categories:

- The first category contains the researches that are having a direct connection with the design proposal. They have had a big contribution in architectural point of view or solving problems. An example is visible on the previous page in figure 12. It is a research about the organisation of the collective spaces in relation to the dwellings. This research is done to understand where the collective spaces need to be located to create a right interaction between the private dwellings and the collective spaces. This is all done with having my target group in mind.
- The second category contains researches that are not directly related with the design proposal. This doesn't necessarily mean that the research was useless. An example is shown in figure 13, where I have done a research to try to understand how a modular facade can be attached to the main structure of the building. Compared to figure 12, this kind of research is not directly visible in the design proposal. It is a way of studying the systematics of using modularity in the facade. More research is needed to have a direct contribution in the design proposal.
- The third category contains researches that are having neither a direct nor indirect relation with the design proposal. An example is shown in figure 14 which is a research I have done in week 7 of the process. I looked at references that are dealing with floods due to sea level rise. This was by then part of my topic but through the process I decided not taking it into account for my design proposal. Even though it doesn't have any contribution in the design proposal, it helped working on my personal development in the form of improving my research skills and enhancing my general knowledge about subjects.

It makes sense to conclude that the first category gets priority because it has a big contribution for the design proposal. However, each category shows that it can be help- and/or learn full. That's why I think it is good to do research through the entire process no matter the contribution of the research.

IMPROVING RESEARCH AND DESIGN PROCESS

Based on previous paragraphs, a big diversity of research (methods) has been used at different phases in the process. I have defined several questions which I will answer to get to know what can be improved in this entire research and design process.

Am I satisfied with how the research and design questions have been answered?

Looking at the answer in chapter 2 on the research question in relation to my topic it becomes clear that it is a quantitative research and not directly something to do with an architectural decision. The accurate research results by elaborating them and putting it into perspectives shows that effort is done in understanding the problem and how it can be tackled with the design proposal. However, with the answer I have given, the research question is not only "where" water resilient measures should be taken place but also "how". In that way it can be concluded that the definition of the research question could have been more accurate.

The answer on the research question in relation to my target group is derived from a research process where I used both literature and individual research. This helped me understanding the essence of the problem my target group has. Eventually, this results in an answer that is elaborated in a way that it both explains which tools can be used and what should be considered when designing a building with compact dwelling units. In that way a clear and detailed answer is given.

Finally, I answered the design question. The answers of the research questions are objective in a way that it also can be used by other people, but that is not really the case with the answer on the design question. Personally, I see it more as an elaboration on how I integrated both topic and target group in an architectural way in my design proposal. I think it is a clear answer that elaborates how architectural elements have been used that represent the relevance of the project and I am satisfied with that. However, I think that by having defined the design questions more specific that it would have resulted in a more useful result.

Could other research methods have contributed in enhancing the quality of the answers on the research and design questions?

The big variety of research methods I used during the entire process have had a big contribution in solving both architectural and technical problems, answering my research and design questions and improving my personal knowledge. Nevertheless, I'm convinced that there is always room for improvement. For me, I

think that the factor "time" is key in the answer I'm about to give. Every design assignment is different and so is the time span you have. Even though I have done way more research compared to the non-graduation design studios I have attended, I actually wanted to add some more personal research as well. So, for example, I now used literature to get to know the preferences of my target group. The literature is getting outdated and the question is how much it is still matching with the actual preferences of my target group. That's why I intended to do an own survey to get specific and actual results but due to limited time that has not been possible.

Furthernore, I think that other kinds of research could have contributed in enhancing the quality of the answers, but that will go at the expense of other research results due to the time I had. So, a balance was found in which research is essential, how much time is needed for that research and prevent that it will have too much negative consequences for other kinds of research.

Do I think that I quit too early when having derived research results that answer the research and design questions?
Also, here I would like to mention the factor "time". It causes that a research sometimes had to be finished earlier than expected. In a negative point of view, it can mean that the research had the potential to get a more accurate research result. In a positive point of view, it makes sure that I didn't get lost in one specific research. Personally, I always looked for a balance between on the one hand a more general research that can be finished relatively fast and on the other hand a very precise research that takes a lot of time.

This is the mindset I had through the process. I continued doing research until I was sure that I got the results I needed to continue with the design process. So, even though I wish I could have done more research, I'm not disappointed with the research results I have now.

With the knowledge I have gained over the entire process, would I have done it differently?
I wouldn't say I would have done it differently in a way that I'm not satisfied about the amount of research I have done in the entire process. But I do think that, especially after the P2, decisions could have been made in a shorter period. This because I have struggled a long time with for example coming up with a massing that represents the building which can be elaborated in a way that it makes sense. It didn't feel right to rush this research, because the massing is a crucial aspect of the architectural representation of the building in the environment. So, that is why I spent a lot of time on that research. This caused that after my P2 many drawings were postponed or had to be changed drastically, which was time consuming.

While looking back on this process, a big variety of different kinds of research have been done, which makes me very enthusiastic. One thing that I would like to improve is the usage of literature research. After the P2 I have read many books in relation to compact dwellings, flexible housing and water resilient designs, but I have the feeling that sometimes the step is missing in making the translation of the theories I have read into my design proposal.

COMPARING HYPOTHESES WITH RESEARCH RESULTS
In this paragraph I will compare the hypotheses of my graduation plan with the answers on the research questions in relation to my topic and target group and my design question.

In relation to my topic I have written the following in my graduation plan: "*I think it all has to do with how the building is working together with the surroundings. A certain flexibility is needed as well in order to cover even more concerning results about the amount of rain that will fall in the future. Furthermore, I think the challenge is to use or absorb the rainwater in such way that it won't go (directly) to the sewage system. The ideal situation will be when the building and environment can solve the problem on their own, which means that the sewage system don't have to process extreme amounts of rainwater anytime. Eventually, I see a challenge where different scenarios need to be covered with an integrated design approach for both building block and environment.*".

By comparing it with the research results from previous chapter there is one similarity and one big difference. What is similar is the fact that I was convinced that rainwater won't go directly to the sewage system. My design proposal makes sure that 100% of the rainfall on building scale level will be absorbed in a way that it won't go to the sewage system.

Looking at the differences, it is clear that in my hypotheses a high ambition has been set in which I wanted to solve multiple water problems with one proposal by letting building and environment work together. Around the P2 I decided to focus on one of the water problems (the extreme rainfall) that can be solved on building scale level. This helped me focussing on the building itself, so it prevented me spending (too much) time on a subject that won't be represented in the building design.

In relation to my target group I have written the following in my graduation plan: "*I think that the answer is lying in the way how the dwellings are being multifunctional. I already read books from Beazley (2002) and Gutierrez (2018) in which multifunctionality is mentioned as one of the key elements in realising a compact but comfortable dwelling. Another answer could be how some functions will be neglected in each dwelling but will become shared spaces outside the dwelling. I think it can enhance the quality of the building which indirectly causes that starters would enjoy living in the building block. The question is, how the shared spaces should be designed to fulfil the demands of the starters? So, the focus doesn't only lay on the dwelling scale but also on building scale level in answering this research question. To find the answers, the selected case studies will be analysed in chapter 6.*".

With this hypothesis I already headed in the right direction with answering the research question. I already realised, based on the literature I had read, that there is on the one hand aspects such as multifunctionality and at the same time transforming private functions into collective functions.

I have been able to answer the question I asked myself in the hypothesis. I looked more into detail into the preferences of the starter to understand which functions could become collective. At the same time, I had to solve a variety of preferences because of the many types of households that fall under the target group starters. The challenge was to understand which of the functions had to be collective and what dimensions it needed to get in relation to the dwellings. That is something which I didn't know when I wrote the hypothesis.

Finally, I have written the following in relation to my design question: "*I think that architecture is a tool to unite my topic and target group in my design proposal. Research will be necessary to understand on which scale level which (design) problem can be solved. Making the place liveable depends most on how the environment and building block will be shaped and behave in relation to the rainwater problems. In relation to my target group I think the interior aspect of the dwelling will be important. Focussing not only on creating a compact dwelling, but also on the relation between the functions inside the dwelling and the functions outside the dwelling, mostly as shared spaces, is needed. So, designing on different scale levels is needed to react on the problem statements of both my topic and target group to eventually being able to answer my design question.*".

It becomes clear that the focus had to lay on working on different scale levels. That is a fair answer, but it lacks elaborating the architectural representation of the building. In other words, when I was writing my hypothesis I had not really an idea how my design proposal would look like, so it was by then difficult to think about architectural elements that I now have used that represent both my topic and target group.

Another aspect that is lacking in the hypothesis is the relation architecture has with building technology. Behind every architectural decision lays a certain building technology challenge. By having worked on both aspects at the same time I have been able to make a feasible architectural expression that both represents my topic and target group.

RELATION BETWEEN RESEARCH AND DESIGN

Based on the things I have described in this chapter a few things become clear:

- The diversity of used research methods through the entire process not only can have a big contribution in the design proposal, it also contributed in my personal development.
- A balance needs to be found in the amount of research, the quality of the research and the time that can or should be spend for every research. Also, it is good to decide which kind of research needs more time than others to get research results that are useable.
- Through the entire process a shift is visible from the research phase to design phase. That doesn't mean that the research process will be stopped. On the contrary, even in the design phase research is needed, but it will be used differently.

A scheme of which I think that it is a good representation of the relation between research and design is one I saw for the first time in my Bachelor (figure 15). It is the "Five generic elements" from Van Dooren et al. (2014)[1]. It gives an overview of doing research by working in different domains (scale levels) with different research tools which will be directed by a guiding theme within a frame of reference.

This makes the research and design process on one hand very chaotic but on the other hand it is the best way to come up with an integrated design. In that way you make sure that during the entire process the focus will be kept reaching a certain goal. For me, the goal was to have a design proposal that both solve the problems related to my topic and target group now and in the future.

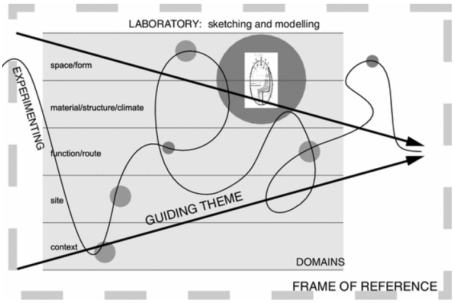

Figure 15. *The five generic elements of a research.* (Van Dooren et al., 2014).

1. Van Dooren, E., Asselbergs, T., Van Dorst, M., Boshuizen, E., Merriënboer, J. (2014). Making explicit in design education: generic elements in the design process. International Journal of Technology and Design Education, Volume 24, Issue 1, 53-71.

4. OVERALL REFLECTION

For this final chapter an overall reflection will take place in which I describe my learning curve and how the feedback from my tutors have influenced both my personal development and my design proposal. Furthermore, I will reflect on the scientific relevance and transferability of my research, the ethical issues I have encountered and the relationship between my topic, studio topic and master track.

MY LEARNING CURVE

As described in the introduction of this report, the entire process can be summarised as a journey with many ups and downs. It was a process in which I had to show my abilities in relation to architecture, building technology, doing research and how that is all integrated in one design proposal. Besides, it was a process in which I improved my knowledge and skills in relation to these three aspects, it was also a process that contributed in my personal development. I want to describe my learning curve by giving a few examples from the process.

What became clear for me was the importance of doing research during the entire process. With the non-graduation design studios I have attended, I only had 10 weeks. This caused that I didn't have enough time to do enough types of research. Therefore, I had to make decisions quickly. Now, I was able to define my own topic and target group, which made it more challenging but fun at the same time, because the design really represents the conclusions of the research. This makes it a more reliable and realistic proposal.

Instead of a process of 10 weeks it has been a process of more than 40 weeks. That means that more accuracy and elaboration was possible. The challenge was to keep time efficient. By first thinking in schemes and diagrams I have been able to think separately about different design aspects and which research and drawing methods I wanted to use for that. Eventually, the transition of thinking in schemes and diagrams to architectural drawings had to take place at some point in the process and I think that can take place in three ways:

- Not spending a lot of time at making schemes and diagrams but focussing directly on the architectural drawings. This can cause that the concept of the building is not feasible and can't be elaborated properly.
- This option is focused fully in making the schemes and diagrams work. It can be good for the final design, but the risk is that too much time will be spent in making them work individually. Eventually, problems can occur with bringing the individual schemes and diagrams together into an integrated design proposal.
- The last one is a combination of the previous two options. The result is that a balance between time-efficiency and quality is realised, which means that enough time will remain to focus on other aspects of the design proposal as well. It will be the best approach to create an integrated design proposal.

Between the P2 and P3 I realised that I was focussing too long making all the schemes and diagrams work, which is the second option. I was convinced that making the schemes and diagrams work perfectly would result that the integration process will go smoother. Even though it was good to focus a lot at the schemes and diagrams I realised that I can't solve all the problems by just looking at these drawings. So, around the P3 I really started focussing in bringing all the aspects together.

What I have learnt is the importance of start bringing the separate schemes and diagrams together early in the process, even though they are not perfect yet. This helps creating a clear organisation in the design and a little amount of exceptions will be needed. It will prevent that at the end of the process too many problems will arise that can't be solved properly in time.

Besides having learned a lot during this process, it was also a test for me. Through the five years I have been studying at the architectural faculty of the TU Delft, I have learnt a lot. The main reason for that is the high amount and the variety of the tutors and experts I have been in touch with. They all have a small contribution in the skills and knowledge I have now.

For me, the past months felt as a way to show to both the tutors and I what I'm capable of. It is for example interesting that I have used structural and climate calculations that I have learnt in the first year of my Bachelor. Another example is how I have used different drawing techniques, which have been improved a lot through the years. It makes the drawings more readable which makes it possible to have different layers of information in one drawing.

Finally, I want to describe how the Corona virus has influenced my graduation journey and what I have learnt from it. The biggest difficulty I had was the uncertainty. The limited amount of consult time caused that I had to think about what I really wanted to ask to make sure that I can continue with my design. It was also difficult to get an idea how the other students were doing with their design. We were able to see each other's products during the Zoom (online) meetings, but that was only a limited number of drawings. I missed the opportunity to really talk with each other and try to share ideas in order to help each other solving problems and improving the design.

However, this uncertainty gave me the opportunity to make design decisions completely by myself. That was sometimes a bit scary because I'm used to discuss ideas first with my tutors. By having been sometimes a bit scared shows that I maybe have relied too much on other people's feedback and opinion. This process of making individual decisions has helped me being more confident, which is I think very useful to become an architect.

Another challenge was keeping both the concentration and motivation since I have been working every day at home. Normally, I work at home as well, but the two consults a week at the faculty helped breaking the pattern of being at home all the time. I didn't expect that not having this small bit of social contact would have such an impact.

Being at home all the time made it tempting to postpone things in this long process. The result was that around the P3 I realised that I really had to set for myself deadlines to achieve things. I started solving problems I encountered which resulted in a phase in which many problems in a short notice were solved. Due to this change in mindset I have been able to make a lot of progress from the P3 to the P4.

It can be concluded that I improve my skills and knowledge during every design process and the right mindset is important as well. Design decisions must be taken with confidence and prevent postponing subjects too long helps improving the final design a lot.

INTEGRATION OF THE TUTORS' FEEDBACK

Another subject I want to mention in this chapter is how I dealt with the tutor's feedback and how it is translated in my design.

The true willingness of the tutors to help me out was a relief. A completely different connection between tutor and student was present in this graduation studio compared to previous non-graduation design studios I have attended. Due to the limited amount of time, the feedback I got was directly translated in my design, which means that some of the elements in the design were not really my idea. Now, the tutors were really focussed on helping me out with the ideas I had instead of directly saying what I should implement or not. This difference in the connection between me and the tutors shows that the previous design studios were focussed on gaining knowledge, while it now was focussed on improving the gained knowledge. The communication between me and the tutors was less formal, which made the consults more pleasant and comfortable.

Because I had now three tutors, instead of one main tutor during the non-graduation design studios, I had at the beginning some difficulties to understand their different ways of working. For architecture, the focus was relatively fast on making accurate integrated drawings. For building technology, the focus was for a longer period on working in schemes and diagrams. Looking back at this it makes sense, because a good balance was realised between schemes and diagrams and architectural drawings that contain different layers of information. But at the beginning it was new for me to have different drawing methods at the same time.

Also, here I would like to mention the influence of the Corona virus. It caused that we had Zoom (online) meetings instead of consultancy at the faculty. For, me it was sometimes difficult to understand the feedback in the right way because we didn't have the proper tools to make sketches during the consults.

Normally, at the faculty a conversation takes place in which sketches will be made to research possibilities, explain things and share our knowledge. This was difficult during the online meetings. Even though everybody is on the same boat with this, it was sometimes frustrating, because I like showing my interest in topics we discuss and show that I have the right knowledge. Unfortunately, this was not always possible due to the limited consult time and the lack of clear drawing tools to make the online conversations as understandable as verbal conversations.

SCIENTIFIC RELEVANCE AND TRANSFERABILITY OF MY RESEARCH AND DESIGN

There are different ways how my research and design can be relevant for other people. Some can use it for their research and others might use it for their design. The variety in research methods that I have used results that my work doesn't specifically has to be used by people that are working in the architectural world. I will give some examples to get an idea of what the scientific relevance and the transferability is of my research and design.

One of the research methods I have used is analysing case studies. I have looked at the organisation of the floor plans and how a balance is created between the compact dwellings and collective functions. This way of analysing can also be done for my design. I have my own solutions for solving the organisation of the floor plans and the balance between compact dwellings and collective functions which can be analysed. It is possible to say that my design can be used by somebody else.

Furthermore, I think it is fair to say that there is a difference in the scientific relevance of objective and subjective research. The subjective types of research are less relevant because I have made personal decisions which can be different if somebody else had to make these decisions. An example is shown in figure 13 (of the previous chapter) which focuses on researching the ways to make a modular facade. This is a research where no references have been used. So, in that point of view the scientific relevance is not that high, but I can imagine that it can help people getting insight in the possibilities to let them make their own decisions.

Objective research is the type of research that enhances the transferability of my research. In other words, the research results are reliable and can be used by others. The figures 3 and 11 are good examples of objective research, because I used statistics and/or literature and tried to combine different references. It is unlikely that these kinds of research have been done in the exact same way in the past. That is what the research results makes unique and relevant for others when they need it.

In my graduation plan I already tried answering what the relevance will be of my graduation work in the larger social, professional and scientific framework. I answered it as follows: "*With focussing on creating Minervahaven water resilient and make my design affordable for starters, I am focussing on solving two problems with one design proposal. By having compact dwellings, in order to make it affordable for starters to live in Amsterdam, I solve a social problem and at the same time it contributes in creating a high density and inclusive environment. The high density of the urban design proposal of Minervahaven in which my design proposal will be located contributes in creating the "one million new homes in 2030" and is in line with the vision the municipality of Amsterdam has for the development strategy of Haven-Stad (2017). At the same time, by reacting on the increase in more extreme rainfall in the present and in the future, my design proposal will solve an environmental problem as well.*

I see a challenge where architecture and building technology are coming together. The collaboration of different disciplines is needed to both react on the environmental and the social problems we face now and in the future. I see it as a sustainable design proposal. By being part of the group of students who learnt integrating sustainability in every design proposal while studying architecture, I feel responsible to give something back to the community that not only solve something in the present but also prevent enhancing or creating new problems in the future. Sustainability is an important aspect in the design (process) and will definitely be present in my design as well.".

Personally, I think it gives a decent overview of how I have been dealing with solving problems in relation to my topic and target group. It shows that the rele-

vance of my project has not only to do with whether other people can use my research results in a scientific point of view. It is also about what my design proposal gives back to the community and how my design is taking different needs in the future into account to make it a sustainable proposal. One aspect that is missing in the hypothesis is the transferability of my research and design. The hypothesis is focusing too much on the design and not the research.

ETHICAL ISSUES AND DILEMMAS I HAVE ENCOUNTERED

Decisions have to be made during every design process. In my opinion, the best choice is where a balance is found between what will be neglected and what will be enhanced. Sometimes it is difficult to justify the decisions that have been made. In the following part I will describe some of the ethical issues and dilemmas I have encountered and I how I have dealt with it.

I have faced the most ethical issues and dilemmas with the decision I have made in relation to my target group. To make it for starters affordable to live in Amsterdam I have decided to make compact dwellings ranging from 22 to 44 m^2. Because it is lower than 50 m^2 it means that some regulations can be ignored. This means that for example no balconies and private storage spaces are mandatory.

The questions I asked myself were: "*What is the quality of the design when using the national defined regulations? Do I really want that none of the dwellings have balconies? Isn't it a luxury to have some private storage space?*". These kinds of questions helped me deciding what to do: *"Following the national regulations which makes the building construction process cheaper or add more quality to the design by adding elements that are not mandatory?"*.

Eventually, I have chosen for the second strategy. This results that I created a balance between dwellings that are having either French balconies or normal balconies. Furthermore, besides the collective storage space in the basement I have created zones with private storage space which results that 30% of the dwellings have an own storage space. These extras that are enhancing the quality of living in the building are expensive but will be compensated by other measurements I have taken that are reducing the building costs. An example is using a modular facade system that will be built in the factory and can be attached to the load bearing structure directly when it arrives at the construction site.

Another ethical dilemma I want to mention is that every corner of the building and many outdoor spaces are reserved for collective space. Because I have starters as target group a big diversity in the preferences is present. A dilemma I encountered was what kind of strategy I wanted to have. Are the collective functions on every floor level different or is there a coherence on all the floor levels? I have focussed on the preferences which are most mentioned by the starters to decide which of the preferences will be integrated and which wouldn't. In that way I have tried to find a balance between collective and private spaces and at the same time being confident that the shared spaces will be used by most of the starters.

In relation to my topic I have also had a dilemma. I was thinking about whether I should take both the environment and building or just the building into account for making the design water resilient. By only looking at building scale results that the problem on environment scale needs to be solved by somebody else which is maybe in ethical point of view not fair.

In the answer of the research question in relation to my topic in chapter 2 I have made the decision to focus only on the building scale level. I have made that decision because the municipality of Amsterdam has established a norm that says something about how on building scale level the rainwater should be retained. It is unknown how the environment is part in this, and I wanted to be precise in solving the extreme rainfall problems. This means that the rainfall problems on a bigger scale level isn't part of my design and should be tackled by the municipality or another organisation.

The benefit of focussing only on building scale level is that I have been able to make the design water resilient in a way[1] that it meets the municipality' norm and on top of that the retained rainwater don't have to go to the sewage system at all.

I'm convinced that if you focus on one aspect it becomes more accurate and reliable than when multiple aspects (in this case both thinking about the environment and building scale level) needs attention at the same time.

1. As described in chapter 2 where I answered the research question in relation to my topic.

With previously mentioned examples I wanted to show that I have tried to make a design which has a balance between the consequences and the benefits that are the result of justifying the ethical decisions I have made in relation to my topic and target group.

RELATION BETWEEN MY DESIGN, STUDIO TOPIC AND MASTER TRACK

In all the previous paragraphs and chapters I have described in a detailed way how I have experienced the entire process. The research process has been described, decisions and consequences have been elaborated, my personal development is explained etc. All these aspects have been part of this graduation studio. Finally, I want to describe the relation of my design with the studio topic and master track I attended.

Therefore, I made for the last time a connection with my graduation plan in which I have written the following: "*With the graduation studio called "Between standards and ideals" it refers, in my opinion, to a design assignment with the challenge to give something back to the community. With architecture, I feel responsible to both give something back to the society by transforming space into place (place making) and at the same time solving problems we face now and in the future. With having "Minervahaven water resilient" as title for my graduation project I would like to design something that solves the water problems we will face now and the even more concerning problems in the future. New ideals will be tried to be found and translated into a design proposal, which is in line with the goals of the Dutch Housing Graduation Studio mentioned in the course manual. I think researching and analysing the existing is key in realising this. We can only get a step closer to our ideals if we learn from the past, which is an important aspect of what I have learnt during my Bachelor and my Master Architecture. I don't want to be too focused on a specific aspect of my design that I want to solve. But moving between different scale levels while using different research methods and tools, helps me creating a design proposal that not only solve the problems in a better way, it also enhances the quality of the design.*".

By reading this it becomes clear that I was already aware that a combination of doing research and working on different scale levels is needed during a research and design process. What I like about the piece of text is how architecture can contribute in giving something back to the community. During the five years at the faculty I have started to learn the standards of architecture, but also what the aim is. For me, the aim of architecture is not specifically focussing on designing something beautiful. That will be the outcome of a process in which objective and subjective research will be done and (ethical) design decisions will be made to tackle problems we as a community face now. At the same time, the challenge is to design a building that can respond when changes in preferences, lifestyle or environmental conditions occur, which makes the design proposal sustainable.

As an architect you have to deal in every design process with a different context, topic, target group, program etc. The architect is responsible for what he or she gives back to the community. Therefore, they have to make ethical decisions and think about sustainable measurements. All these important variables make every process unique. Sometimes more research will be needed and sometimes more time is needed in making the design in sustainable point of view work. In every process there is room to learn which can be used for the next design assignment. That's what I really like about being an architect. It motivates me to finish my Master Architecture soon so, I can start giving something back to the community with the knowledge I have gained in this busy but learn full and exciting journey.